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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

ANTHONY A. BARRETTO ET AL

Serial No. 10/827,557 (TI-33631.1)

Filed April 20, 2004

For: SUBSTRATE ALIGNMENT METHOD AND APPARATUS

Art Unit 1725

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BRIEF ON APPEAL

REAL PARTY IN INTEREST

The real party in interest is Texas Instruments Incorporated, a Delaware corporation with offices at 7839 Churchill Way, Dallas, Texas 75251. A mechanical Board is requested since the invention is mechanical in nature and involves no chemistry.

RELATED APPEALS AND INTERFERENCES

The parent application was allowed after filing of a Brief on Appeal and is now Patent No. 6,871,394.

STATUS OF CLAIMS

This is an appeal of claims 9 to 21 all of the rejected claims. No claims have been allowed. Claims 1 to 8 are the subject of the parent application which is now Patent No. 6,871,394. Please charge any costs to Deposit Account No. 20-0668.

STATUS OF AMENDMENTS

An amendment was filed after final rejection and entered for purposes of appeal.

SUMMARY OF CLAIMED SUBJECT MATTER

The invention according to claim 9 relates to an apparatus for ensuring proper contact between a plurality of substrates and a lifting device with a plurality of vacuum pads in a semiconductor packaging process. The substrates (110) are placed, one each, in a plurality of depressions in a substrate tray (300, see also Fig. 4), each depression having a hole (Figs. 3b and 3c, 410 in Fig. 4 and page 9, lines 19 to 21) for coupling to a plate (310). The plate with a plurality of protrusions (320) is provided and raised, each protrusion extending through a different one of the holes (Figs. 3b and 3c) and maintaining level or leveling the substrate in the corresponding depression while lifting the substrate concurrently with the other of the plurality of substrates in the other of the depressions (Fig. 3c). A lifting device (210) having vacuum pads (220) attaches to the substrates and lifts the substrates out of the tray (Figs. 3b and 3c). A first actuator (page 9, lines 16 to 19) is coupled to the plate and raises and lowers the plate and a second actuator (page 10, lines 18 to 20) lowers and raises the lifting device. A vacuum (page 8, lines 1 to 15) is applied at the vacuum pads to temporarily attach the substrates to the vacuum pads.

The invention according to claim 19 relates to a system for applying solder bumps to substrates (110) in a flip chip packaging process. The system includes a loader station (710) to load substrates into a substrate tray (300) and a flipping station (715) coupled to the loader station to flip substrates held in the substrate tray. The flipping station includes a plate (310) with a plurality of protrusions (320). A flipping device (page 13, lines 7 to 21) with a plurality of vacuum pads (220) is coupled to the substrate tray to attach to the substrates, lift the substrates out of the substrate tray, and flip the substrates. A first actuator (page 9, lines 16 to 19) is coupled to the plate to raise and lower the plate and a second actuator (page 10, lines 18 to 20) is coupled to the flipping device to lower and raise the flipping device. A solder bump application station (720) is coupled to the flipping station to apply and bond solder bumps to the substrates.

GROUND OF REJECTION

Claim 9 was rejected under 35 U.S.C. 103(a) as being unpatentable over Grover (U.S. 2,355,643) in view of Smith (U.S. 5,588,797).

Claims 10 and 11 was rejected under 35 U.S.C. 103(a) as being unpatentable over Grover and Smith in view of Garcia (U.S. 5,785,484).

Claim 12 was rejected under 35 U.S.C. 103(a) as being unpatentable over Grover, Smith and Garcia in view of Dudderar (U.S. 6,205,745).

Claims 13 and 14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Grover and Smith in view of Beyer (U.S. 6,003,676).

Claims 15 to 17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Grover in view of Smith in view of presumably the same Grover.

Claim 18 was rejected under 35 U.S.C. 103(a) as being unpatentable over Grover and Smith in view of Dudderar.

Claim 19 was rejected under 35 U.S.C. 103(a) as being unpatentable over Garcia (U.S. 5,785,484) in view of Dudderar.

Claims 20 and 21 were rejected under 35 U.S.C. 103(a) as being unpatentable over Garcia in view of Dudderar in view of Dudderar (presumably the same Dudderar).

ARGUMENT

Claim 9 was rejected under 35 U.S.C. 103(a) as being unpatentable over Grover (U.S. 2,355,643) in view of Smith (U.S. 5,588,797). The rejection is without merit.

Claim 9 relates to an apparatus for lifting substrates in a semiconductor packaging process. No such type of apparatus is shown in either of the applied references.

Claim 9 further requires a substrate tray with a plurality of depressions and a hole in each depression for coupling to a plate, the substrate tray to hold a substrate in each depression. No such structure or the entire combination as claimed is found in either of the applied references.

Claim 9 further requires a plate with a plurality of protrusions coupled to the substrate tray, each of the protrusions extending through a different hole and maintaining level or leveling the substrate in the corresponding depression while lifting the substrate concurrently with the other of the plurality of substrates in the other of the depressions. No such structure or the entire combination as claimed is found in either of the applied references.

Claim 9 further requires a lifting device with a plurality of vacuum pads coupled to the substrate tray, the lifting device to attach to the substrates and lift the substrates out of the substrate tray. No such structure or the entire combination as claimed is found in either of the applied references.

Claim 9 further requires a first actuator coupled to the plate, the first actuator to raise and lower the plate and a second actuator to lower and raise the lifting device. No such structure or the entire combination as claimed is found in either of the applied references.

Claim 9 further requires vacuum application apparatus at the vacuum pads to attach the substrates to the vacuum pad. No such structure or the entire combination as claimed is found in either of the applied references.

Claims 10 and 11 was rejected under 35 U.S.C. 103(a) as being unpatentable over Grover and Smith in view of Garcia (U.S. 5,785,484). The rejection is without merit.

Claims 10 and 11 depend from claim 9 and therefore define patentably over the applied references for at least the reasons presented above with reference to claim 9 since Garcia fails to overcome the deficiencies of the other applied references as noted above.

Claim 12 was rejected under 35 U.S.C. 103(a) as being unpatentable over Grover, Smith and Garcia in view of Dudderar (U.S. 6,205,745). The rejection is without merit.

Claim 12 depends from claim 10 and therefore defines patentably over the applied references for at least the reasons presented above with reference to claim 9 since Dudderar fails to overcome the deficiencies of the other applied references as noted above.

Claims 13 and 14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Grover and Smith in view of Beyer (U.S. 6,003,676). The rejection is without merit.

Claims 13 and 14 depend from claim 9 and therefore define patentably over the applied references for at least the reasons presented above with reference to claim 9 since Beyer fails to overcome the deficiencies of the other applied references as noted above.

Claims 15 to 17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Grover in view of Smith in view of presumably the same Grover. The rejection is without merit for reasons stated above with reference to claim 9 from which this claim depends.

Claim 18 was rejected under 35 U.S.C. 103(a) as being unpatentable over Grover and Smith in view of Dudderar. The rejection is without merit.

Claim 18 depends from claim 9 and therefore define patentably over the applied references for at least the reasons presented above with reference to claim 9 since Dudderar fails to overcome the deficiencies of the other applied references as noted above.

Claim 19 was rejected under 35 U.S.C. 103(a) as being unpatentable over Garcia (U.S. 5,785,484) in view of Dudderar. The rejection is without merit.

Claim 19 requires, among other features, a flipping station coupled to the loader station, the flipping station to flip substrates held in the substrate tray, the flipping station comprising a plate with a plurality of protrusions, a flipping device with a plurality of vacuum pads coupled to the substrate tray, the flipping device to attach to the substrates, lift the substrates out of the substrate tray, and flip the substrates and a first actuator coupled to the plate, the first actuator to raise and lower the plate. No such structure is

taught or even remotely suggested by Garcia. In fact, there is no provision in Garcia whatsoever for flipping a substrate. It follows that the combination with Dudderar is only suggested by the subject disclosure and not by the cited art, even were Dudderar to teach flipping of a substrate of chip, which it does not. The combination is therefore improper.

In addition, a review of Dudderar will reveal that Dudderar does not flip a substrate but rather flips a chip carrier tape. This is an entirely different problem than flipping a substrate and has nothing whatsoever to do with the direct flipping of a substrate or a semiconductor chip.

Claims 20 and 21 were rejected under 35 U.S.C. 103(a) as being unpatentable over Garcia in view of Dudderar in view of Dudderar (presumably the same Dudderar). The rejection is without merit.

Claims 20 and 21 depend from claim 19 and therefore define patentably over the applied references for at least the reasons presented above with reference to claim 19.

CONCLUSIONS

For the reasons stated above, reversal of the final rejection and allowance of the claims on appeal is requested that justice be done in the premises.

Respectfully submitted,



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CLAIMS APPENDIX

The claims on appeal read as follows:

9. An apparatus for lifting substrates in a semiconductor packaging process, the apparatus comprising:

a substrate tray with a plurality of depressions and a hole in each depression for coupling to a plate, the substrate tray to hold a substrate in each depression;

a said plate with a plurality of protrusions coupled to said substrate tray, each of said protrusions extending through a different said hole and maintaining level or leveling the substrate in the corresponding depression while lifting said substrate concurrently with the other of the plurality of substrates in the other of said depressions;

a lifting device with a plurality of vacuum pads coupled to the substrate tray, the lifting device to attach to the substrates and lift the substrates out of the substrate tray;

a first actuator coupled to the plate, the first actuator to raise and lower the plate;

a second actuator to lower and raise the lifting device; and

vacuum application apparatus at said vacuum pads to attach the substrates to the vacuum pad.

10. The apparatus of claim 9, wherein the protrusions are flat at their tops.

11. The apparatus of claim 10, wherein the protrusions are rectangular in cross section.

12. The apparatus of claim 10, wherein the protrusions are square in cross section.

13. The apparatus of claim 9, wherein the first and second actuators are pneumatic actuators.

14. The apparatus of claim 9, wherein the first and second actuators are hydraulic actuators.

15. The apparatus of claim 9, wherein the protrusions are of sufficient height so that when the plate is raised into the bottom of the tray, the protrusions lift the substrates up off the bottom of the tray.

16. The apparatus of claim 9 further comprising a third actuator, coupled to the lifting device, the third actuator to move the lifting device away from the tray to a different position.

17. The apparatus of claim 16, wherein the third actuator moves the lifting device after the lifting device has been raised back up after lifting substrates from the substrate tray.

18. The apparatus of claim 9 further comprising a vacuum generator coupled to the flipping device, the vacuum generator to produce a vacuum at each vacuum pad of the flipping device to form a temporary bond between the vacuum pad and the substrate.

19. A system for applying solder bumps to substrates in a flip chip packaging process, the system comprising:

a loader station to load substrates into a substrate tray;

a flipping station coupled to the loader station, the flipping station to flip substrates held in the substrate tray, the flipping station comprising:

a plate with a plurality of protrusions;

a flipping device with a plurality of vacuum pads coupled to the substrate tray, the flipping device to attach to the substrates, lift the substrates out of the substrate tray, and flip the substrates;

a first actuator coupled to the plate, the first actuator to raise and lower the plate;

a second actuator coupled to the flipping device, the second actuator to lower and raise the flipping device;

a solder bump application station coupled to the flipping station, the solder bump application station to apply and bond solder bumps to the substrates; and

wherein the first actuator raises the plate into the bottom of the substrate tray, the second actuator lowers the flipping device into the substrate tray when the substrate tray is in the flipping station.

20. The system of claim 19 further comprising a vacuum generator coupled to the flipping device, the vacuum generator to produce a vacuum at each vacuum pad of the flipping device to form a temporary bond between the vacuum pad and substrates.

21. The system of claim 20, wherein the flipped substrates are place back into the substrate tray after being flipped by the flipping station.

EVIDENCE APPENDIX

Not Applicable

RELATED PROCEEDINGS APPENDIX

Not applicable